JELL-E

THE REVOLUTION OF EMOTIONS

Jell-E: the first robotic jellyfish for kids

Students:

Giorgio Brugali
Alessandro Caruso
Greta Corti
Leonardo Gargani
Yeran Liu

Professors:

Andrea Bonarini
Maximiliano Ernesto Romero

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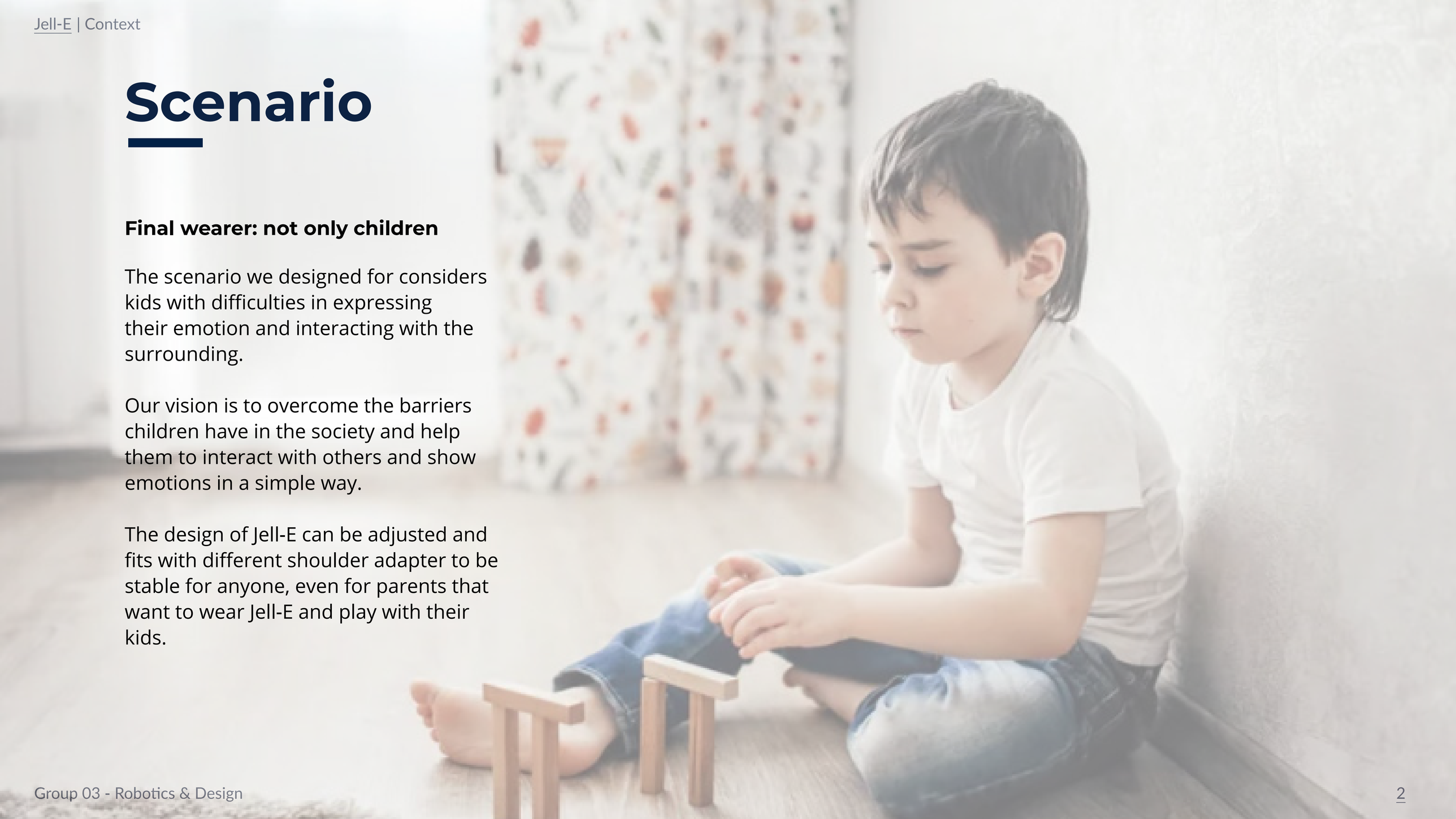
Scenario

Final wearer: not only children

The scenario we designed for considers kids with difficulties in expressing their emotion and interacting with the surrounding.

Our vision is to overcome the barriers children have in the society and help them to interact with others and show emotions in a simple way.

The design of Jell-E can be adjusted and fits with different shoulder adapter to be stable for anyone, even for parents that want to wear Jell-E and play with their kids.



Concept

Jell-E: psychological perspective

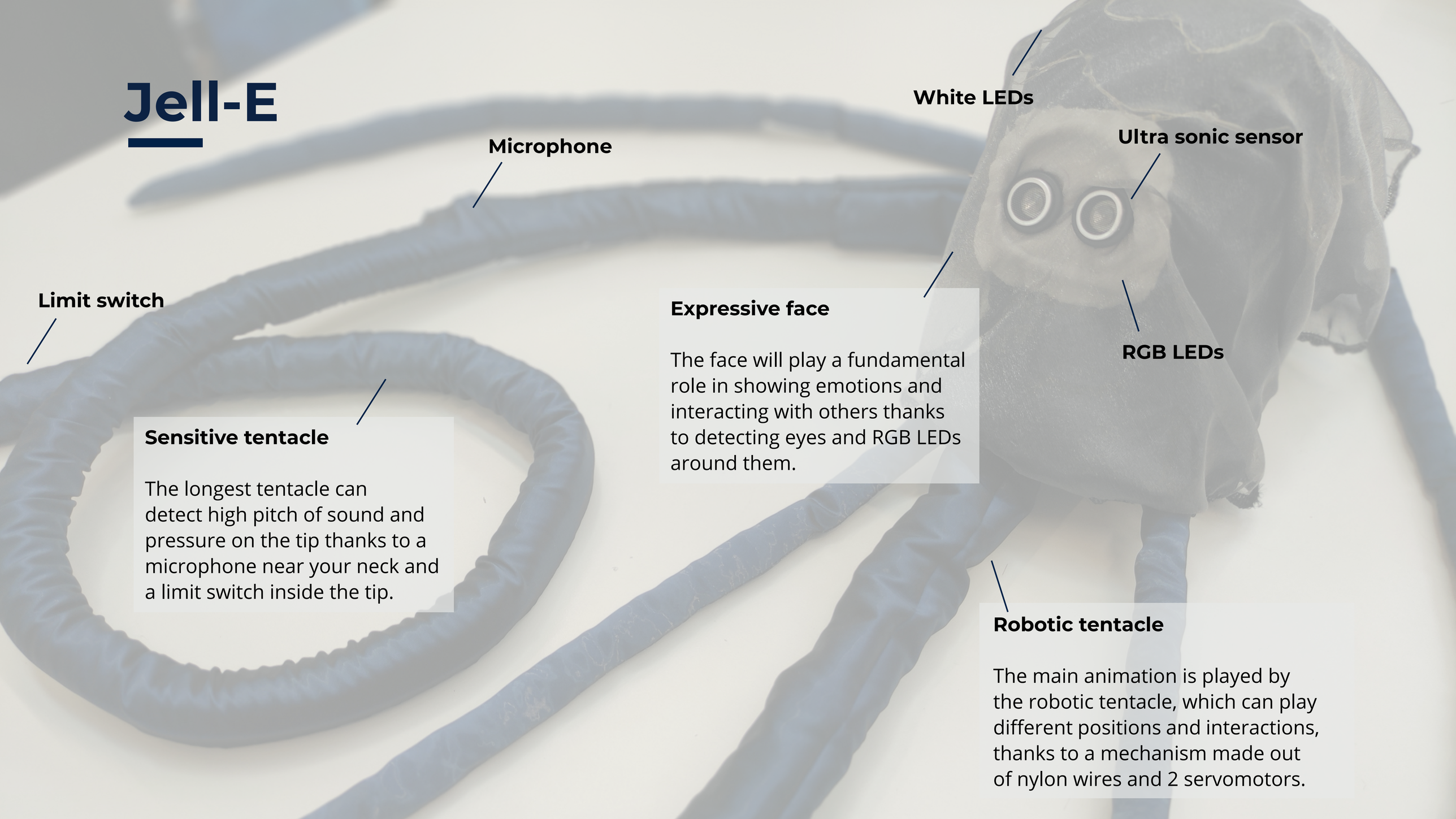
The project aims to be a mean for kids to communicate and express themselves through a so called *transitional object*: the rapresentation of an object which kids use to make a transition from childhood to a first approach to the interactive world with others.

Fluffy wearable robot

The concept is oriented to a wearable jellyfish, coverd by a comfortable material that make it a perfect puppet, while still being a robot and preserving its own educational goal.


JELL-E

Jell-E



Expressive face

The face will play a fundamental role in showing emotions and interacting with others thanks to detecting eyes and RGB LEDs around them.

Sensitive tentacle

The longest tentacle can detect high pitch of sound and pressure on the tip thanks to a microphone near your neck and a limit switch inside the tip.

Robotic tentacle

The main animation is played by the robotic tentacle, which can play different positions and interactions, thanks to a mechanism made out of nylon wires and 2 servomotors.

Flowchart

Interactions

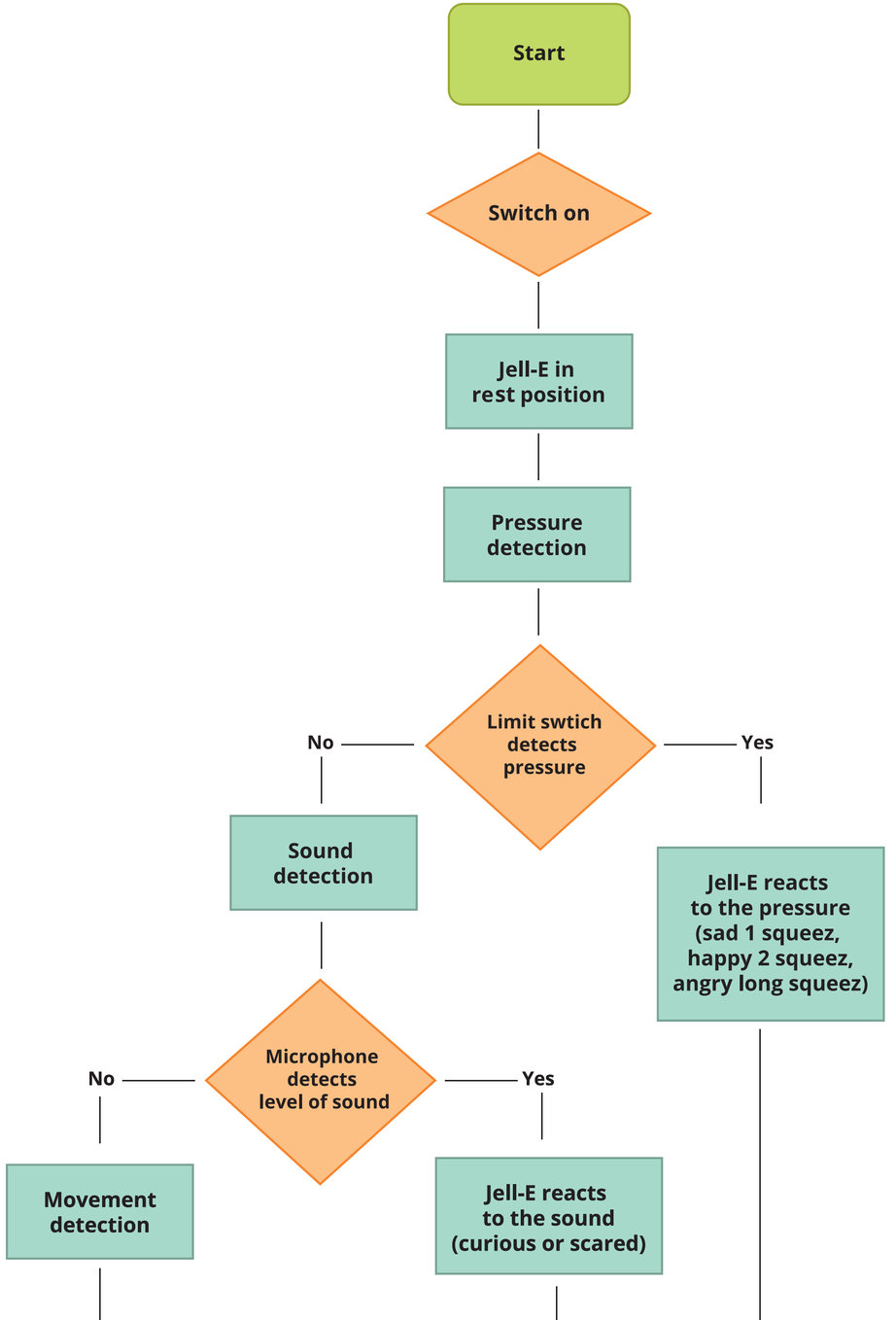
The simplification of the interactions is carried out by three different layers of detection:

Pressure detection

Sound detection

Movement detection

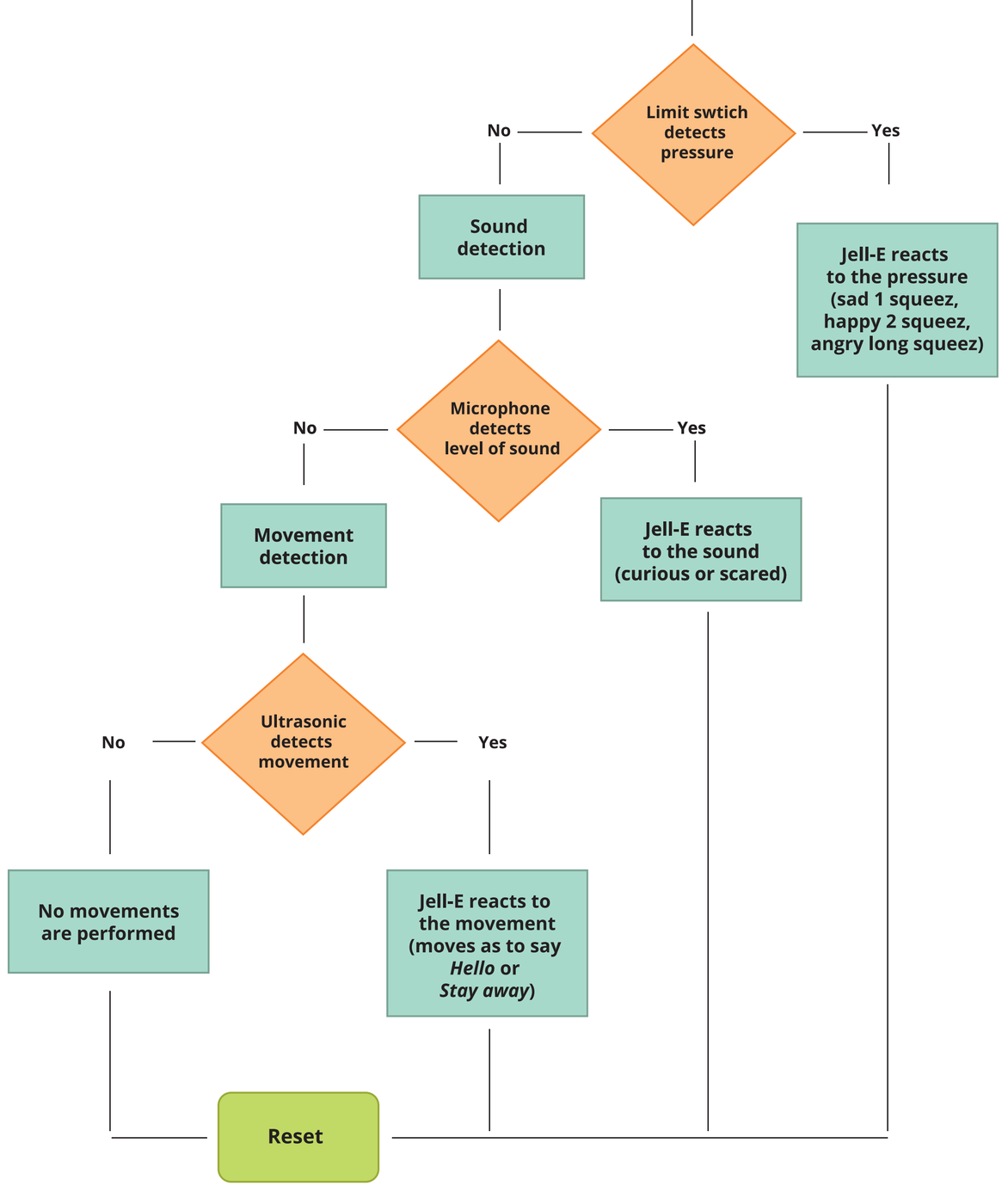
Each input correspond to a different movement of the robotic arm and a LED color, to express a specific emotions or perform an emotion.



Flowchart

Interactions

The high-level flowchart is made to schematize and better explain in detail every single action the robot will perform, according to the movements of the **mechanical arm**, the **LEDs** host in the head and the **pressure** and **sounds** that it will detect from the tentacles.



Bill of Material

List of material used

The table synthesizes all the materials used to create the robotic jellifish.

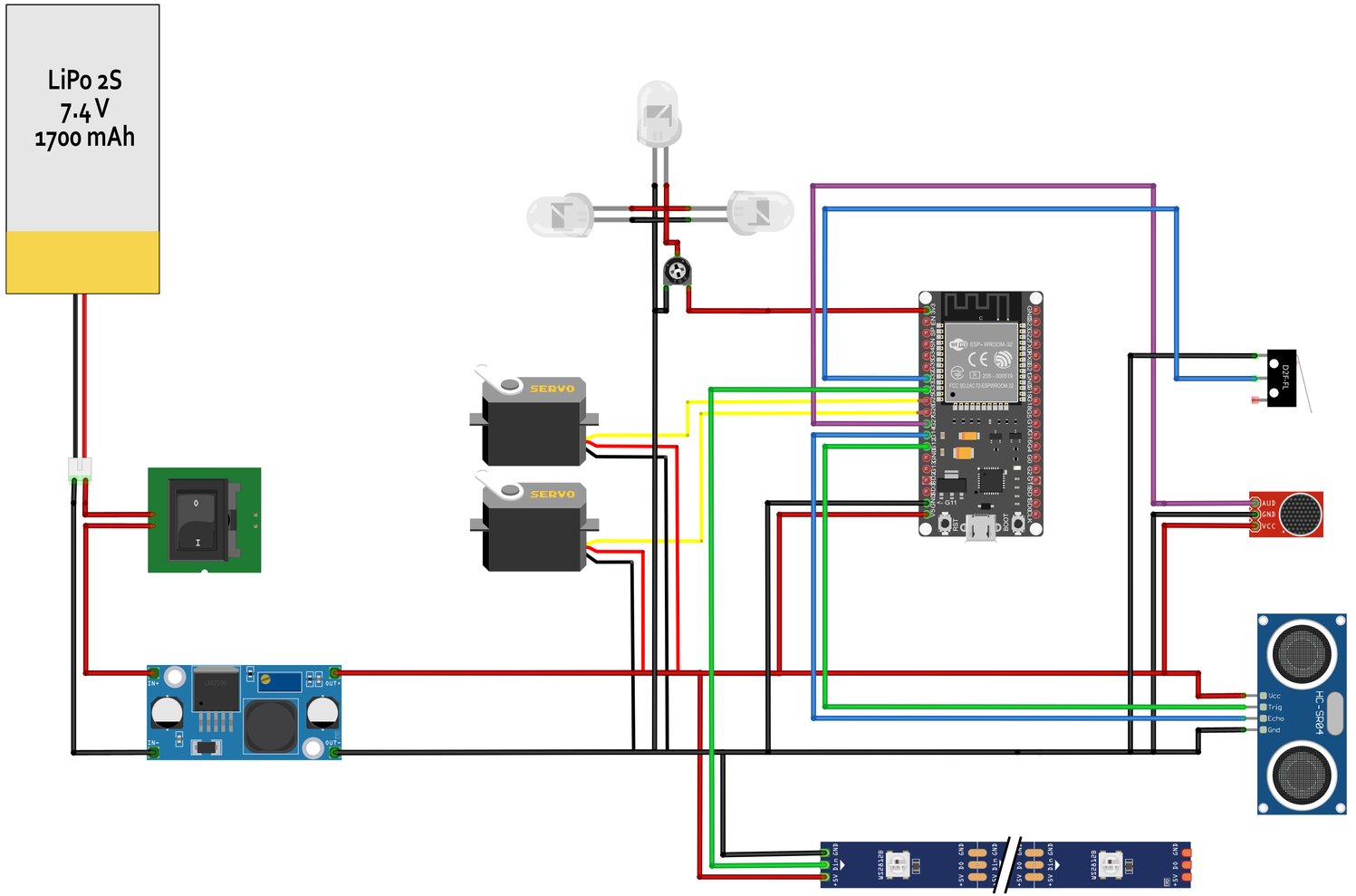
The main items are dedicated to the internal part and the cover made of fabric.

The adapter for the shoulder comes as a standard piece, that we customised adding padding and velco.

Material Adapter	*Quantity*
Shoulder brace Stability	***1***
Velcro Stability	***1***

Material Robot	*Quantity*
Servomotor Robotic tentacle - Interactions	***2***
ESP micro controller Main functionality	***1***
Battery 1700 mAh Main functionality	***1***
Addressable RGB LED strip Eyes - Emotions	***10***
Limit Swtich Tentacle - Interactions	***1***
Voltage step-down converter Main functionality	***1***
Ultrasonic distance sensor Eyes - Interactions	***1***
Microphone Tentacle - Interactions	***1***
LED strip light Cover - Emotions	***20***

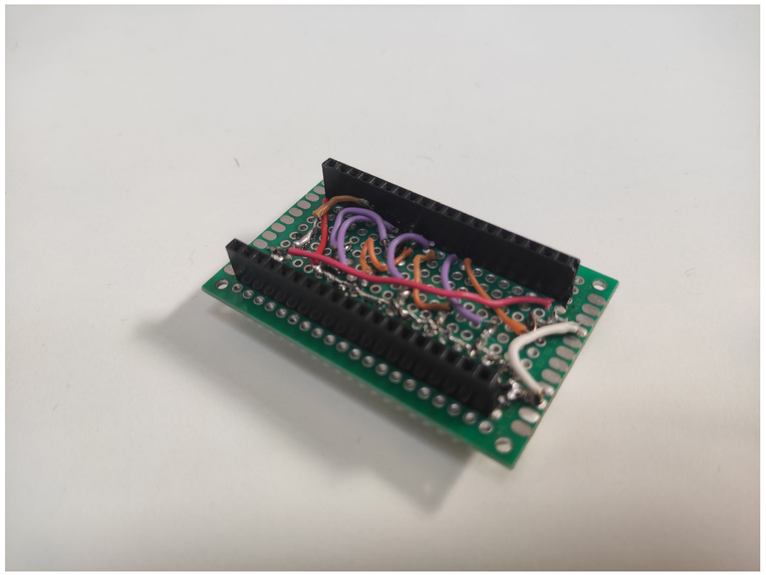
Circuit diagram



Schematic circuit

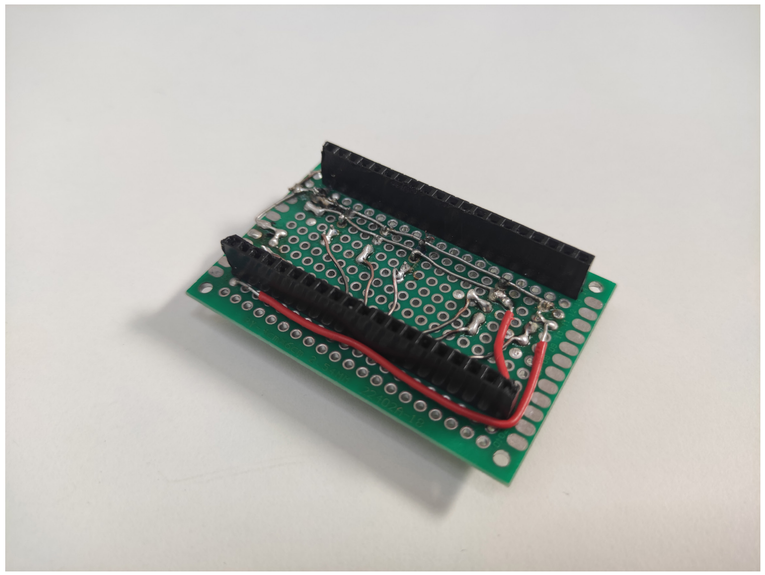
All the functionalities and the capabilities of Jell-E are summarized in the circuit diagram, which lists and explains all the single electrical components has been involved in the design process.

Board



Previous version

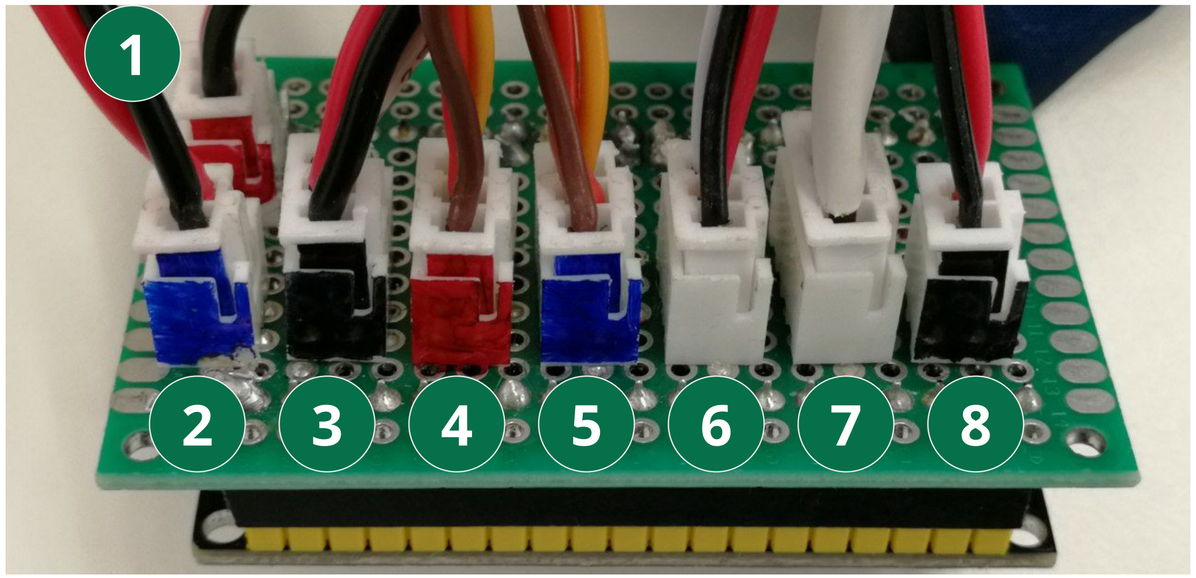
The cables have been welded to the board to have more control and a more reliable result.



Current version

The welding has been improved in the organization to be cleaner and optimal.

Board



Number and colors

1 - Limit switch
2 - Step down
3 - LED Strip
4 - Servo motor
5 - Servo motor
6 - Microphone
7 - Ultra sonic
8 - Lights

Design for maintenance

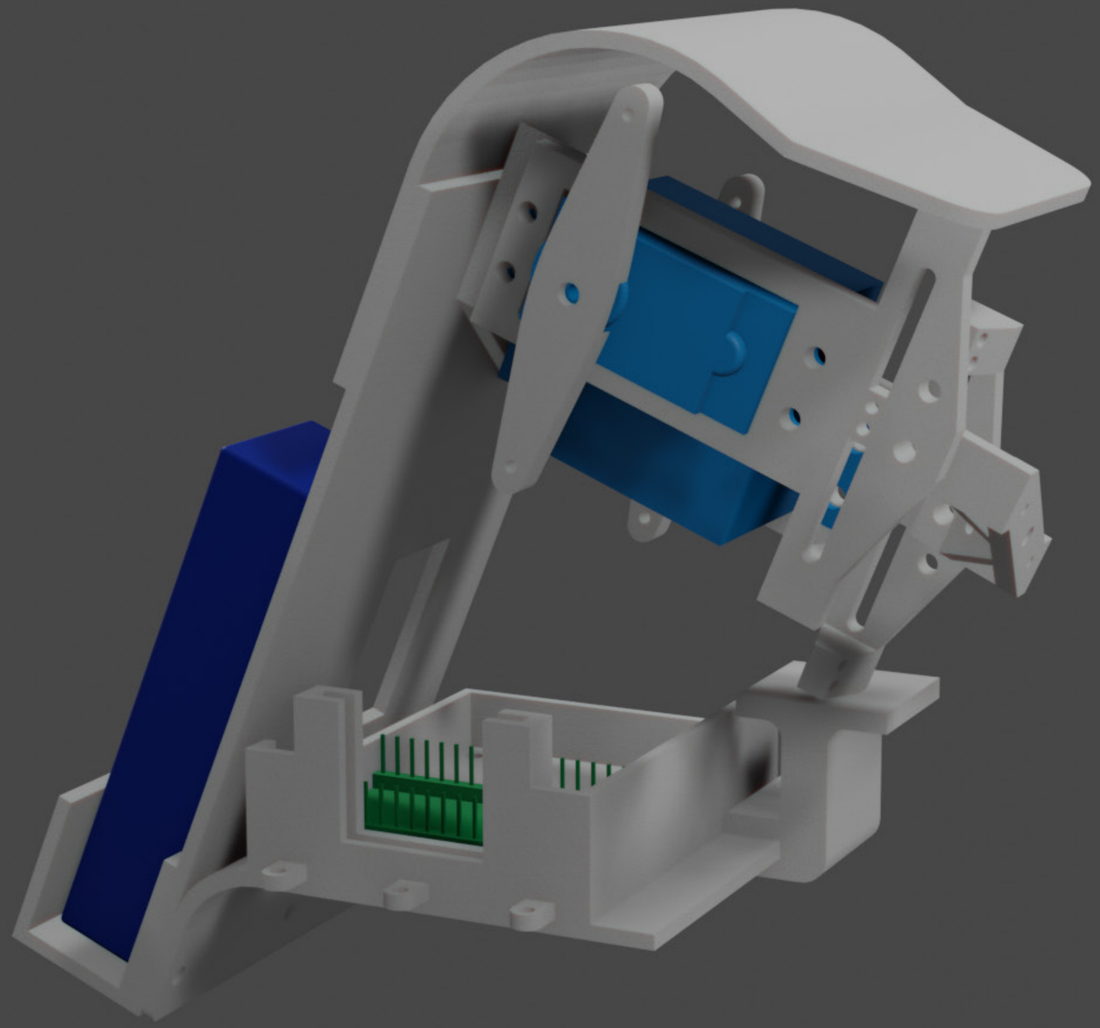
The pins and their relative JST connectors are colored to be recognized during the assembly and disassembly process.

Hardware

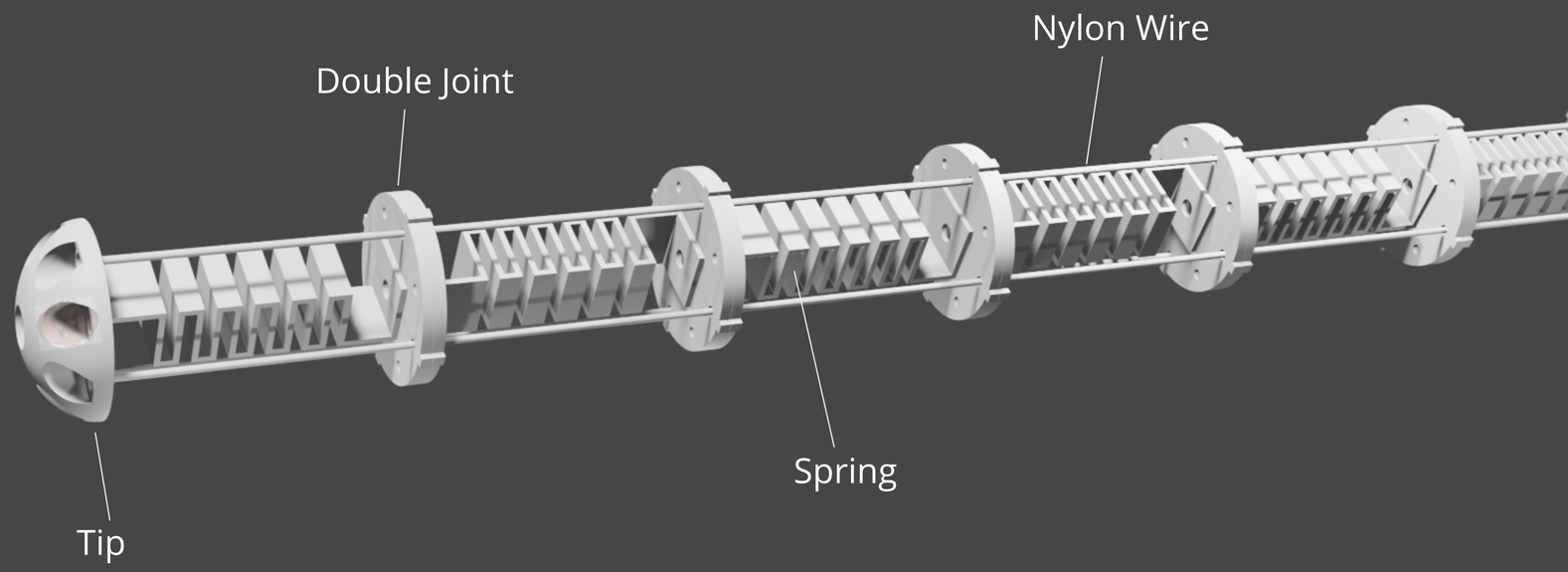
The internal structure is designed to host the servomotors for the robotic tentacle and all the electrical components, from the ESP to the step down , including the space for the wires.

The design is optimized to be realised by additive manifacturing, avoiding waste of material for supports.

The box for ESP and step down has a particular joint to attach the tentacle, which holds microphone and limit switch.



Robotic Tentacle



The robotic tentacle is the main protagonist of the interaction. It interprets the user's feedback and it translate into movement, showing emotions according to the colors displayed by the eyes.

The design is based on 3 simple 3D printed parts.

The movement is based on nylon wires, managed by the servomotors along the two different axis.

Shoulder Adapter

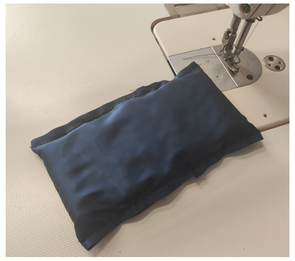
Adaptability

Jell-E comes with a shoulder adapter to make the robot more stable and fix it to the shoulder of the user.

The manufacturing process to adjust a standard adapter to Jell-E is pretty simple: it has an internal padding made of fabric and foam and hads velcro to attach Jell-E to it.

Sizes

Obviously the adapter can be substituted since it comes in 3 different sizes, and it can be worn by the kids and the parents as well.



Eyes

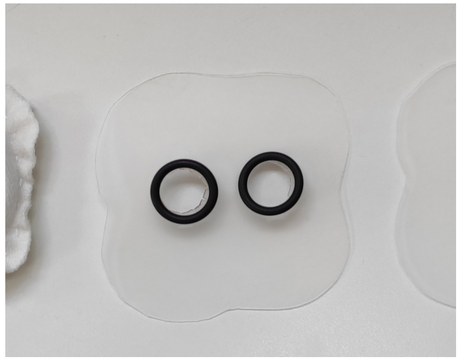
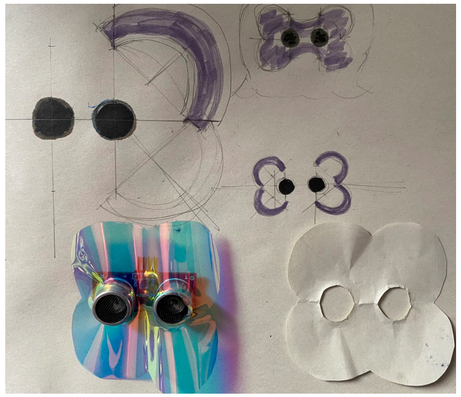
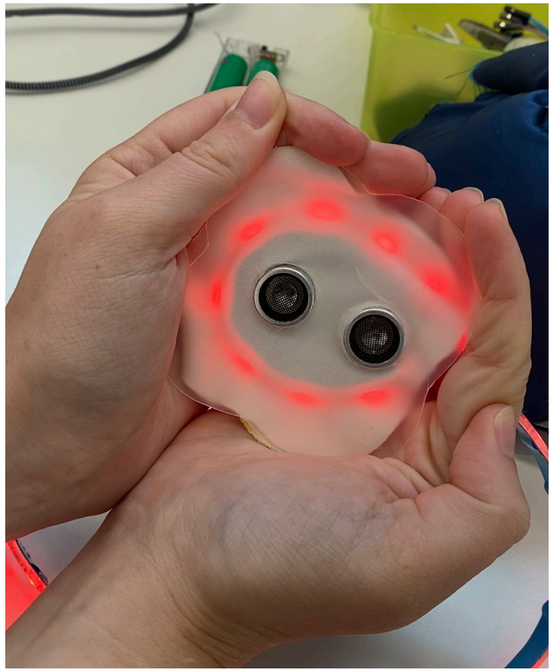
Adressable LEDs strip light

To give more realism to Jell-E the colors of the emotion has been translated into a pocket around the ultra sonic sensor, which look like eyes, made of white fabric, to permit a correct display of the colors.

Fabrication of the eyes

Since the fabric of Jell-E is not transparent the eyes are made out of a white strechable fabric, where a pocket to let the strip pass has been sewn. A hole has been made on the outer fabric to be able to connect the LEDs inside.




Emotions & Interactions

Breath

resting position

Sad

1 squeez

Happy

2 squeez

Angry

Long squeez

Stay away

Near

Hello

Swing hand

Scared

Scream

Thank you

Team 03

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